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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 08/849,746
Filing Date: September 05, 1997
Appellant(s): LOHER ET AL.

Stephen B. Schott
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 9, 2005 appealing from the Office action mailed October 4, 2004.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

4,356,228	Kobayashi et al.	10-1982
4,662,887	Turner et al.	05-1987
5,156,588	Marcune et al.	10-1992
5,223,556	Gotoh et al.	06-1993
JP 02-145327	Ichikawa et al.	06-1990
JP 01-258918	Uematsu	10-1989
EP 0 373 294 A2	Shimada	06-1990
WO 91/02906	Gapp et al.	03-1991
DE 37 39 582 A1	Waku et al.	06-1988

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

B. Claims 1-4, 7, 11, 13-14 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 373 294 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Turner *et al.* (US Patent No. 4,662,887).

EP 0 373 294 teaches the basic claimed process of forming a fiber reinforced thermoplastic component including, preparing a rod blank (6) from a fiber reinforced thermoplastic material having a plurality of fibers (2) embedded within a PEEK thermoplastic matrix, positioning said blank in a mold, heating said entire blank inside said mold at a temperature above the softening (melting) temperature of the thermoplastic material and compressing said blank inside said mold to form said fiber reinforced thermoplastic component. Since the thermoplastic material is heated above the softening (melting) temperature, it is submitted that the thermoplastic material flows inside the mold to take the shape of the mold surface (shaping the blank in the negative mold by virtue of the entire blank flowing from the heating stage into the negative mold) (see Abstract and Figure 6).

Regarding claim 1, EP 0 373 294 does not teach heating the blank outside the mold. Kobayashi *et al.* ('228) teaches a molding process of a fiber reinforced thermoplastic blank including, preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state) in a hot air furnace oven outside the mold, placing said heated blank between traveling molds and, molding said blank under pressure, said such that said thermoplastic material flows and fills said mold (see col. 7, lines 52-63). Therefore, it would have been obvious for one of ordinary skill in the art to have preheated the fiber reinforced thermoplastic blank to a soft, flowable state outside the mold and then compression molded said blank as taught by Kobayashi *et al.* ('228) in the process of EP 0 373 294 because of known advantages that preheating provides such as, reduced molding time, hence improving productivity and lowering costs.

Further regarding claim 1, EP 0 373 294 does not teach pressing speed of 2-80 mm/s. However, in a compression molding process, the pressing speed is well known to be a result-effective variable as evidenced by Kobayashi *et al.* ('228) which teaches a molding process of a fiber reinforced thermoplastic blank including, preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state) in a hot air furnace oven outside the mold, placing said heated blank between traveling molds at a speed of 4 mm/s and, molding said blank under pressure, said such that said thermoplastic material flows and fills said mold (see col. 7, lines 52-63). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a compression speed of 4 mm/s as taught by Kobayashi *et al.* ('228) in the process of EP 0 373 294 because, Kobayashi *et al.* ('228) teaches that such a speed provides for an aesthetically improved product (see col. 7, lines 60-65) and also because, both references teach compression molding of heated fiber reinforced thermoplastic blanks, hence teaching similar materials and processes.

Further regarding claim 1, it is noted that EP 0 373 294 teaches molding of a PEEK/carbon fiber composite screw. However, whether said screws are used for aerospace or medical applications is a functional limitation. In a claim drawn to a process, recitation of the intended "medical" use of the claimed "screws" step must result in a structural difference between the claimed process and the prior art in order to patentably distinguish the claimed invention from the prior art. As such, in a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. However, in order to advance prosecution of the instant application, the teachings of Turner *et al.* ('887) are provided

to show that it is well known to make medical components from a PEEK/carbon fiber composite (see Abstract and col. 6, lines 55-56). Therefore, it would have been obvious for one of ordinary skill in the art to use a PEEK/carbon fiber composite as taught by Turner *et al.* ('887) to make a medical screw using the process of EP 0 373 294 in view of Kobayashi *et al.* ('228) because, Turner *et al.* ('887) specifically teaches that a PEEK/carbon fiber composite may be used to make medical devices, whereas EP 0 373 294 teaches molding of screws made from a PEEK/carbon fiber composite. Furthermore, it is noted that if the prior art structure, as taught by Turner *et al.* ('887) is capable of performing the intended use of a medical screw, as claimed, then it meets the claim.

In regard to claim 2, EP 0 373 294 teaches continuous (endless) fibers in a proportion of 60-70% by weight. It is submitted that a fiber proportion of 70% by weight is more than 50% by volume (see col. 8, lines 10-20).

Specifically regarding claim 3, EP 0 373 294 teaches forming a fiber reinforced thermoplastic rod and cutting said rod to form a blank (see col. 8, lines 10-30).

Regarding claims 4 and 11, EP 0 373 294 teaches continuous (endless) fibers (Elongated fibers) (2) arranged in a parallel direction (col. 8, lines 15-20).

In regard to claim 7, EP 0 373 294 teaches axially compressing (pushing) a heated pre-finished blank to obtain said fiber reinforced thermoplastic component and pulling said formed component.

Specifically regarding claim 13, it should be noted that EP 0 373 294 teaches the use of "continuous" fibers having the same length as the resulting molded article. It is submitted that

the resulting screw (fasteners) of EP 0 373 294 is longer than 3 mm. Therefore, the fibers used in the process of EP 0 373 294 are also longer than 3 mm.

Regarding claim 14, EP 0 373 294 teaches that the fibers are enclosed by the thermoplastic resin (see Figure 7).

In regard to claims 28-31, EP 0 373 294 teaches a rod-shaped, circular blank (see Figure 6).

C. Claims 1-5, 7, 11-14 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-145327 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Marcune *et al.* (US Patent No. 45,156,588).

JP 02-145327 teaches the basic claimed process for manufacturing fiber reinforced thermoplastic components including, forming a fiber reinforced thermoplastic tubular blank (13), cutting said fiber reinforced thermoplastic tubular blank to form a pre-finished blank (16), positioning said pre-finished blank (16) in a mold (18) (negative mold), heating said pre-finished blank (16) at a given temperature in said mold (18) (heating the entire blank to a forming temperature in a heating stage) and axially compressing said heated pre-finished blank in said mold (18) to obtain said fiber reinforced thermoplastic component (22). Further, JP 02-145327 teaches that the fibers are enclosed by the thermoplastic resin (see Figures 4-6). Therefore, it is submitted that shaping of the pre-finished blank (16) in mold (18) by heating and axial compression occurs by flowing of the heated thermoplastic material of the pre-finished blank during the axial compression stage (shaping the blank in the negative mold by virtue of the entire blank flowing from the heating stage into the negative mold).

Regarding claim 1, JP 02-145327 does not teach heating the blank outside the mold.

Kobayashi *et al.* ('228) teaches a molding process of a fiber reinforced thermoplastic blank including, preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state) in a hot air furnace oven outside the mold, placing said heated blank between traveling molds and, molding said blank under pressure, said such that said thermoplastic material flows and fills said mold (see col. 7, lines 52-63). Therefore, it would have been obvious for one of ordinary skill in the art to have preheated the fiber reinforced thermoplastic blank to a soft, flowable state outside the mold and then compression molded said blank as taught by Kobayashi *et al.* ('228) in the process of JP 02-145327 because of known advantages that preheating provides such as, reduced molding time, hence improving productivity and lowering costs.

Further regarding claim 1, JP 02-145327 does not teach pressing speed of 2-80 mm/s. However, in a compression molding process, the pressing speed is well known to be a result-effective variable as evidenced by Kobayashi *et al.* ('228) which teaches a molding process of a fiber reinforced thermoplastic blank including, preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state) in a hot air furnace oven outside the mold, placing said heated blank between traveling molds at a speed of 4 mm/s and, molding said blank under pressure, said such that said thermoplastic material flows and fills said mold (see col. 7, lines 52-63). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a compression speed of 4 mm/s as taught by Kobayashi *et al.* ('228) in the process of JP 02-145327 because, Kobayashi *et al.* ('228) teaches

that such a speed provides for an aesthetically improved product (see col. 7, lines 60-65) and also because, both references teach compression molding of heated fiber reinforced thermoplastic blanks, hence teaching similar materials and processes.

Further regarding claim 1, it is noted that JP 02-145327 teaches molding of a nylon/glass fiber composite screw. However, whether said screws are used for aerospace or medical applications is a functional limitation. In a claim drawn to a process, recitation of the intended "medical" use of the claimed "screws" step must result in a structural difference between the claimed process and the prior art in order to patentably distinguish the claimed invention from the prior art. As such, in a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. However, in order to advance prosecution of the instant application, the teachings of Marcune *et al.* ('588) are provided to show that it is well known to make medical components from a nylon/glass fiber composite (see col. 4, lines 30-35). Therefore, it would have been obvious for one of ordinary skill in the art to use a nylon/glass fiber composite as taught by Marcune *et al.* ('588) to make a medical screw using the process of JP 02-145327 in view of Kobayashi *et al.* ('228) because, Marcune *et al.* ('588) specifically teaches that a nylon/glass fiber composite may be used to make medical devices, whereas JP 02-145327 teaches molding of screws made from a nylon/glass fiber composite. Furthermore, it is noted that if the prior art structure, as taught by Marcune *et al.* ('588) is capable of performing the intended use of a medical screw, as claimed, then it meets the claim.

In regard to claim 2, JP 02-145327 teaches continuous (endless) fibers in a proportion of 70% by weight. It is submitted that a fiber proportion of 70% by weight is more than 50% by volume.

Specifically regarding claim 3, JP 02-145327 teaches forming a fiber reinforced thermoplastic tubular blank (13) and cutting said fiber reinforced thermoplastic tubular blank to form a pre-finished blank (16) prior to heating and axially compressing said heated pre-finished blank in said mold (18) to obtain said fiber reinforced thermoplastic component (22) (hot-forming process).

Regarding claim 4, JP 02-145327 teaches continuous (endless) fibers that are knitted as a braided string (13) and as such correspond to at least a length of the blank.

In regard to claims 5 and 12, JP 02-145327 teaches continuous (endless) fibers that are knitted as a braided string (13) and as such form layers of different fiber orientation along the axial axis, said orientation being between 0°-90° (see Fig. 1B).

Specifically regarding claim 7, JP 02-145327 teaches axially compressing (pushing) a heated pre-finished blank (16) in a mold (18) by using a punch (20) to obtain said fiber reinforced thermoplastic component (22) and pulling said formed component.

Regarding claim 11, JP 02-145327 teaches continuous (endless) fibers that are parallel to the axis of the blank (see Figures 4-6).

Specifically regarding claim 13, it should be noted that JP 02-145327 teaches the use of "continuous" fibers having the same length as the resulting molded article. It is submitted that,

the fibers used in the process of JP 02-145327 are longer than 3 mm in order for the screws to function as described.

In regard to claim 14, JP 02-145327 teaches that the fibers are enclosed by the thermoplastic resin (see Figures 4-6).

Specifically regarding claims 28-31, JP 02-145327 teaches a rod-shaped, circular blank (see Figure 2).

D. Claims 5-6 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 373 294 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Turner *et al.* (US Patent No. 4,662,887) and Gapp *et al.* (WO 91/02906).

EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) teach the basic claimed process as described above.

Regarding claims 5-6 and 12, EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) do not teach a laminated blank having fibers oriented in different directions. Gapp *et al.* (WO 91/02906) teach a process of manufacturing fiber reinforced thermoplastic components including, forming panels (36) from fiber reinforced thermoplastic material (PEEK), cutting a section (40) from the panel and machining said section (40) to form a machined blank (52) having a head end (54), a shank portion (56) and a tail end (58) (pre-finished blank) (see Figures 1, 4a, 4b). Further, Gapp *et al.* (WO 91/02906) teach that the panel from which the blanks are cut are formed from a plurality of layers (more than one laminate) having fibers oriented in different directions (see page 7, lines 1-10), such as to form a "0/+45/-45/90" layup. Therefore, it would have been obvious for one of ordinary skill in the art

to have formed a laminated fiber reinforced thermoplastic blank having fibers oriented in different directions as taught by Gapp *et al.* (WO 91/02906) for molding a fiber reinforced thermoplastic component by the process of EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887), as an alternative to using an extruded or drawn fiber reinforced thermoplastic blank, due to a variety of advantages that a laminated blank provides such as simplicity, cost considerations, simpler equipment requirements, increased process versatility and also because both references teach heating and axial compression of a fiber reinforced thermoplastic blank, regardless of the method by which said blank is obtained. Further, it should be noted that both references teach similar materials, processes and end-products. Furthermore, it is noted that Kobayashi *et al.* ('228) teach a fiber reinforced laminate.

E. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-145327 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Marcune *et al.* (US Patent No. 45,156,588) and Gapp *et al.* (WO 91/02906).

JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) teaches the basic claimed process as described above.

Regarding claim 6, JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) does not teach a laminated blank. Gapp *et al.* (WO 91/02906) teach a process of manufacturing fiber reinforced thermoplastic components including, forming panels (36) from fiber reinforced thermoplastic material (PEEK), cutting a section (40) from the panel and machining said section (40) to form a machined blank (52) having a head end (54), a shank

portion (56) and a tail end (58) (pre-finished blank) (see Figures 1, 4a, 4b). Therefore, it would have been obvious for one of ordinary skill in the art to have formed a laminated fiber reinforced thermoplastic blank as taught by Gapp *et al.* (WO 91/02906) for molding a fiber reinforced thermoplastic component by the process of JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588), as an alternative to using a braided fiber reinforced thermoplastic blank, due to a variety of advantages that a laminated blank provides such as simplicity, cost considerations, simpler equipment requirements, increased process versatility and also because both references teach heating and axial compression of a fiber reinforced thermoplastic blank, regardless of the method by which said blank is obtained. Further, it should be noted that both references teach similar materials, processes and end-products. Furthermore, it is noted that Kobayashi *et al.* ('228) teach a fiber reinforced laminate.

In regard to claim 8, Gapp *et al.* (WO 91/02906) teach heating the blank to a temperature of 725 ^{o}F (385 ^{o}C) and then under pressure, cooling the shaped blank until a temperature of 400 ^{o}F (204 ^{o}C). Therefore, it would have been obvious for one of ordinary skill in the art to have heated the blank at a temperature from about 350 ^{o}C to 430 ^{o}C as taught by Gapp *et al.* (WO 91/02906) in the process of JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) because, Gapp *et al.* (WO 91/02906) specifically teach such a molding temperature and JP 02-145327 implies heating the fiber reinforced thermoplastic blank at a temperature above the softening (melting) temperature of the thermoplastic material.

F. Claims 8 and 10 rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-145327 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Marcune *et al.* (US Patent No. 45,156,588) and Gotoh *et al.* (US Patent No. 5,223,526).

JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) teaches the basic claimed process as described above.

Regarding claim 10, JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) does not teach a carbon fiber reinforced PAEK material. Gotoh *et al.* ('556) teach a carbon fiber reinforced PAEK material. Further, Gotoh *et al.* ('556) teach PAEK as a replacement for nylon (see col. 1, lines 44-62). Therefore, it would have been obvious for one of ordinary skill in the art to have used a carbon fiber reinforced PAEK material as taught by Gotoh *et al.* ('556) in the process of JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588), because Gotoh *et al.* ('556) specifically teach PAEK as a replacement for nylon in case of high temperature applications, hence enhancing product quality. Further, it should be noted that the particular use of a certain material is dependent on a variety of unclaimed parameters such as availability, cost considerations, desired characteristics, weight requirements, etc.

In regard to claims 8, JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) do not teach a forming temperature of 350-450°C. However, Kobayashi *et al.* ('228) teach preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state). Further, it should be noted that because JP 02-145327 teaches that the fibers are enclosed by the thermoplastic resin

(see Figures 4-6), it is submitted that shaping of the pre-finished blank in the mold by heating and axial compression occurs by flowing of the heated thermoplastic material of the pre-finished blank during the axial compression stage. Gotoh *et al.* ('556) teach that the molding temperature of PAEK is from about 350 °C to 430 °C (see col. 2, lines 61-65). Therefore, it would have been obvious for one of ordinary skill in the art to have heated the blank at a temperature from about 350 °C to 430 °C as taught by Gotoh *et al.* ('556) in the process of JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) because Gotoh *et al.* ('556) specifically teach such a molding temperature is required for a PAEK material and also because Kobayashi *et al.* ('228) teach preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state).

G. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 373 294 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Turner *et al.* (US Patent No. 4,662,887) and Gotoh *et al.* (US Patent No. 5,223,526).

EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) teach the basic claimed process as described above.

Regarding claim 10, EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) do not teach a carbon fiber reinforced PAEK material. Gotoh *et al.* ('556) teach a carbon fiber reinforced PAEK material. Further, Gotoh *et al.* ('556) teach PAEK as an equivalent replacement for PEEK (see col. 2, lines 52-62). Therefore, it would have been obvious for one of ordinary skill in the art to have used a carbon fiber reinforced PAEK material as taught by Gotoh *et al.* ('556) in the process of EP 0 373 294 in view of Kobayashi *et al.* ('228)

and in further view of Turner *et al.* ('887), because Gotoh *et al.* ('556) specifically teach PAEK as an equivalent replacement for PEEK. Further, it should be noted that the particular use of a certain material is dependent on a variety of unclaimed parameters such as availability, cost considerations, desired characteristics, weight requirements, etc.

In regard to claims 8, EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) do not teach a forming temperature of 350-450 °C. However, Kobayashi *et al.* ('228) teach preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state). EP 0 373 294 teaches heating a fiber reinforced thermoplastic blank in a mold at a temperature above the softening (melting) temperature of the thermoplastic material in order to soften the material (flowing state) such that the fiber reinforced thermoplastic blank assumes the shape of the mold. Gotoh *et al.* ('556) teach that the molding temperature of PAEK is from about 350 °C to 430 °C (see col. 2, lines 61-65). Therefore, it would have been obvious for one of ordinary skill in the art to have heated the blank at a temperature from about 350 °C to 430 °C as taught by Gotoh *et al.* ('556) in the process of EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) because Gotoh *et al.* ('556) specifically teach such a molding temperature is required for a PAEK material and also because Kobayashi *et al.* ('228) teach preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state). Therefore, it would have been obvious for one of ordinary skill in the art to have heated the blank at a temperature from about 350 °C to 430 °C as taught by Gotoh *et al.* ('556) in the process of EP 0 373 294 in view of , Kobayashi *et al.* ('228) and in further view of Turner *et*

al. ('887) because Gotoh *et al.* ('556) specifically teach that such a molding temperature and EP 0 373 294 teaches heating the fiber reinforced thermoplastic blank at a temperature above the softening (melting) temperature of the thermoplastic material.

H. Claims 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 373 294 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Turner *et al.* (US Patent No. 4,662,887) and DE 37 39 582 A1.

EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) teach the basic claimed process as described above.

Regarding claim 16, EP 0 373 294 in view of , Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) do not teach applying a surface seal. DE 37 39 582 A1 teach a process of coating a molten plastic material by applying a carbon coating to a mold surface, injecting a molten plastic material inside the mold, and depositing said coating onto said melt as the carbon coating comes into contact with the molten polymer. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to have provided a carbon coating on the mold surface as taught by DE 37 39 582 A1 in the process of EP 0 373 294 in view of , Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) due to a variety of advantages that such a coating process provides such as, reduced pollution, improved productivity, etc. and also because a carbon coated fastener provides for improved electrical characteristics.

I. Claims 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-145327 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Marcune *et al.* (US Patent No. 45,156,588) and DE 37 39 582 A1.

JP 02-145327 in view of , Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) teaches the basic claimed process as shown above.

Regarding claim 16, JP 02-145327 in view of , Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) does not teach applying a surface seal. DE 37 39 582 A1 teach a process of coating a molten plastic material by applying a carbon coating to a mold surface, injecting a molten plastic material inside the mold, and depositing said coating onto said melt as the carbon coating comes into contact with the molten polymer. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to have provided a carbon coating on the mold surface as taught by DE 37 39 582 A1 in the process of JP 02-145327 in view of , Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) due to a variety of advantages that such a coating process provides such as, reduced pollution, improved productivity, etc. and also because a carbon coated fastener provides for improved electrical characteristics.

J. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 373 294 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Turner *et al.* (US Patent No. 4,662,887) and Lee (US Patent No. 5,244,747).

EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) teach the basic claimed process.

Regarding claim 9, EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) do not teach the use of carbon or graphite as a release agent. Lee ('747) teaches that a carbon-based release agent is equivalent to a fluorocarbon-based release agent when releasing a thermoplastic material (see col. 2, lines 35-40). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a carbon-based release agent as an equivalent to a fluorocarbon-based release agent as taught by Lee ('747) in the process of EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) because, Lee ('747) specifically teaches that a carbon-based release agent is equivalent to a fluorocarbon-based release agent when releasing a thermoplastic material, whereas EP 0 373 294 or JP 02-145327 in view of Kobayashi *et al.* ('228) teach molding of thermoplastic materials and also because a release agent provides for an improved process by reducing post-processing operations.

K. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-145327 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Marcune *et al.* (US Patent No. 45,156,588) and Lee (US Patent No. 5,244,747).

JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) teach the basic claimed process.

Regarding claim 9, JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) do not teach the use of carbon or graphite as a release agent. Lee ('747) teaches that a carbon-based release agent is equivalent to a fluorocarbon-based release agent when releasing a thermoplastic material (see col. 2, lines 35-40). Therefore, it would have been

obvious for one of ordinary skill in the art to have provided a carbon-based release agent as an equivalent to a fluorocarbon-based release agent as taught by Lee ('747) in the process of JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) because, Lee ('747) specifically teaches that a carbon-based release agent is equivalent to a fluorocarbon-based release agent when releasing a thermoplastic material, whereas EP 0 373 294 or JP 02-145327 in view of Kobayashi *et al.* ('228) teach molding of thermoplastic materials and also because a release agent provides for an improved process by reducing post-processing operations.

L. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 373 294 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Turner *et al.* (US Patent No. 4,662,887) and JP 01-258918.

EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) teach the basic claimed process.

Regarding claim 27, EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) do not teach a multiple reciprocating system. JP 01-258918 teaches molding a round fiber reinforced thermoplastic bar at both ends by a multiple push-pull process (see Abstract and Figure 4). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a multiple push-pull process as taught by JP 01-258918 in the process of EP 0 373 294 in view of Kobayashi *et al.* ('228) and in further view of Turner *et al.* ('887) because, JP 01-258918 teaches molding both ends of the bar having similar properties, hence improving productivity.

M. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP 02-145327 in view of Kobayashi *et al.* (US Patent No. 4,356,228) and in further view of Marcune *et al.* (US Patent No. 45,156,588) and JP 01-258918.

JP 02-145327 in view of Kobayashi *et al.* ('228)and in further view of Marcune *et al.* ('588) teaches the basic claimed process.

Regarding claim 27, JP 02-145327 in view of Kobayashi *et al.* ('228)and in further view of Marcune *et al.* ('588) do not teach a multiple reciprocating system. JP 01-258918 teaches molding a round fiber reinforced thermoplastic bar at both ends by a multiple push-pull process (see Abstract and Figure 4). Therefore, it would have been obvious for one of ordinary skill in the art to have provided a multiple push-pull process as taught by JP 01-258918 in the process of JP 02-145327 in view of Kobayashi *et al.* ('228) and in further view of Marcune *et al.* ('588) because, JP 01-258918 teaches molding both ends of the bar having similar properties, hence improving productivity.

(10) Response to Argument

(A) Appellants argue that " EP 0 373 294 discloses processes for forming <u>*airplane*</u> screws...which ignores the sterility and precision required in medical applications." Further, Appellants argue that "JP 02-145327 describes a nylon resin and braided yarn reinforced screw that is formed in a mold and axially compressed by a punch," whereas "Kobayashi, in contrast, discloses several processes for extruding composite *sheets* for use in 'press molding, compression molding, stamping molding.'" Furthermore, Appellants argue that the "mere inclusion of the medical device patents (Turner and Marcune) does not somehow knit together

the disparate aircraft, screw, and sheet references" such that "there is no suggestion to combine the aircraft, sheet forming and medical arts" (see page 7 of the Appeal Brief filed June 9, 2005).

(a) In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

(b) In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

(c) In response to applicant's argument that combination is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case:

(i) The primary reference EP 0 373 294 teaches a process for forming a fiber reinforced thermoplastic screw including, preparing a rod blank (6) from a fiber reinforced thermoplastic material having a plurality of fibers (2) embedded within a

PEEK thermoplastic matrix, positioning said blank in a mold, heating said entire blank inside said mold at a temperature above the softening (melting) temperature of the thermoplastic material and compressing said blank inside said mold to form said fiber reinforced thermoplastic component. Since the thermoplastic material is heated above the softening (melting) temperature, it is submitted that the thermoplastic material flows inside the mold to take the shape of the mold surface (shaping the blank in the negative mold by virtue of the entire blank flowing from the heating stage into the negative mold) (see Abstract and Figure 6).

(ii) The secondary reference Kobayashi *et al.* ('228) teaches a molding process of a fiber reinforced thermoplastic blank including, preheating said blank to a temperature higher than the softening temperature (see col. 4, line 68 through col. 5, line 4) (soft, flowable state) in a hot air furnace oven outside the mold, placing said heated blank between traveling molds at a speed of 4 mm/s and, molding said blank under pressure, said such that said thermoplastic material flows and fills said mold (see col. 7, lines 52-63). Therefore, it would have been obvious for one of ordinary skill in the art to have preheated the fiber reinforced thermoplastic blank to a soft, flowable state outside the mold and then compression molded said blank as taught by Kobayashi *et al.* ('228) in the process of EP 0 373 294 because of known advantages that preheating provides such as, reduced molding time, hence improving productivity and lowering costs. Furthermore, it would have been obvious for one of ordinary skill in the art to have provided a compression speed of 4 mm/s as taught by Kobayashi *et al.* ('228) in the process of EP 0

373 294 because, Kobayashi *et al.* ('228) teaches that such a speed provides for an aesthetically improved product (see col. 7, lines 60-65) and also because, both references teach compression molding of heated fiber reinforced thermoplastic blanks, hence teaching similar materials and processes. It is submitted that preheating in a compression molding process is reasonably pertinent to the particular problem with which the applicant was concerned.

(iii) The teachings of the primary reference EP 0 373 294 are drawn to a PEEK/carbon fiber composite screw used in aerospace applications. However, whether said screws are used for aerospace or medical applications is a functional limitation. In a claim drawn to a process, recitation of the intended "medical" use of the claimed "screws" step must result in a structural difference between the claimed process and the prior art in order to patentably distinguish the claimed invention from the prior art. As such, in a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art.

(iv) In order to advance prosecution of the instant application, the teachings of Turner *et al.* ('887) are provided to show that *it is well known* (emphasis added) to make medical components from a PEEK/carbon fiber composite (see Abstract and col. 6, lines 55-56). Therefore, it would have been obvious for one of ordinary skill in the art to use a PEEK/carbon fiber composite as taught by Turner *et al.* ('887) to make a medical screw using the process of EP 0 373 294 in view of Kobayashi *et al.* ('228) because, Turner *et al.* ('887) specifically teaches that a PEEK/carbon fiber composite may be used to make

medical devices, whereas EP 0 373 294 teaches molding of screws made from a PEEK/carbon fiber composite. Furthermore, it is noted that if the prior art structure, as taught by Turner *et al.* ('887) is capable of performing the intended use of a medical screw, as claimed, then it meets the claim.

(B) Appellants argue that "[N]one of the references alone or in combination, teach 'pressing said heated blank into the negative mold using a pressing head that travels at a speed of 2 mm/sec to 80 mm/sec"...because "Kobayashi teaches 'closing molds'", whereas the present invention claims a "pressing head...that is used in an injection molding type process to inject the pre-heated blank that is at a plastic flow consistency into a mold cavity" (see page 8 of the Appeal Brief filed June 9, 2005). In response it is noted that:

(a) The instant invention is drawn to an extrusion type process and not an injection type process as described in the Appendix of the Appeal Brief filed June 9, 2005 (see paragraph [0059] of the original disclosure).

(b) Under MPEP §2111.01(II), "[I]n the absence of an express intent to impart a novel meaning to the claim terms, the words are presumed to take on the ordinary and customary meanings attributed to them by those of ordinary skill in the art." Further, under MPEP §2111.01, "[D]uring patent examination, the pending claims must be 'given their broadest reasonable interpretation consistent with the specification.'" *See*, In re Hyatt, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000). In this case, in the absence of an explicit definition and without any recitation of structural limitations, the customary and reasonable meaning of a "pressing head" is a device used to impart a shape to a moldable material, hence

whether it described as a "pressing head" or as "closing molds" is irrelevant because both a "pressing head" and "closing molds" will impart a shape to a moldable material.

(C) Appellants argue that a "push-pull process is one in which a thermoplastic is pushed into the mold from a first injection unit, while a second such unit runs in reverse to 'pull the thermoplastic into and through the mold" (see page 9 of the of the Appeal Brief filed June 9, 2005). In response it is noted that:

(a) The instant invention is drawn to an *extrusion* type process and *not* an injection type process (emphasis added) as described in the Appendix of the Appeal Brief filed June 9, 2005 (see paragraph [0059] of the original disclosure).

(b) In response to Appellants' argument that the references fail to show the injection "push-pull" features, it is noted that said features upon which Appellants rely of reversing the direction of travel of the thermoplastic blank while in the mold are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

(c) In the absence of an explicit definition and without any recitation of structural limitations, the customary and reasonable meaning of a "push-pull" process step is taught by EP 0 373 294 which teaches axially compressing (pushing) a heated pre-finished blank to obtain said fiber reinforced thermoplastic component and pulling said formed component.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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